are no fewer than ten species of six genera which are lungless, and that in some of these respiration is largely buccal or pharyngeal, and may even, in all probability, involve the tips of the toes, as in *Autodax* and species of other known genera.

Conspicuous among recently discovered species are three of American origin which are cave-dwellers. Of these, one (a *Spelerpes*), occurring in the Mississippi Vale, has nondegenerate eyes; another (*Typhlotriton*), more restricted in the same region, has eyes which during growth undergo a recognisable degeneration. The third (*Typhlomolge*), discovered in 1896 in the underground waters of Texas, where it was obtained from an artesian well, said by our authors to be now thrown up at the rate of about fifty a year, is quite blind, possessed of functionless eyes. It is with the paper upon this genus that we have chiefly here to deal. The animal itself is of especial interest, as furnishing the much-desired American counterpart for the European *Proteus* long known. It differs from this, however, in being shorter bodied and longer limbed—so much so that the limbs appear by attenuation to have become converted into tactile organs—and the discovery that the eye is destitute of lens, rods and cones, and eye-muscles (which is the most interesting fact announced in these papers) is thus intensely significant, as it presents us among the Batrachia with a condition recalling that of the famous blind locust of the New Zealand caves, in which, under the functional atrophy of the eye, the antennæ have similarly become elongated and more important.

The second paper deals with the eye of the Mississippi cave salamander *Typhlotriton*, which, while "detecting its food by the sense of touch," shows only the first stages of that degeneration of the eye and its associated organs occurring in the Typhlomolge type. Both papers are illustrated, though very poorly, and they do not in this respect compare with previously published works on other blind animals which might be cited. Moreover, there is in the first paper an inexplicable error, for the senior author, stating that "the eye of Typhlotriton will be dealt with in another place" (*i.e.* the second paper herein quoted), continues erroneously to use this generic name in describing the Typhlomolge eye.

Typhlomolge is in every respect a most remarkable creature, as examination of the example preserved in our National Museum at South Kensington will show. The description of its eye, coming to us at a time when there has just been found (in the French Congo area) a frog in which the terminal phalanges of four of the hinder digits, perforating the overlying integument as do the ribs of the long-known Pleurodile Newt, project, freely and exposed, as sharply recurved claws. All this brings forcibly before us the lesson that in morphologically specialised forms of life, such as we are too apt to pooh-pooh, there are to be found facts which, on the whole, are among the most trustworthy, in enabling us to gauge the limits of nature's operations. Truly has Weismann remarked (as pointed out by the senior author in his 1899 Woods' Holl Lecture on "The Blind Fishes") that "an investigation into the history of degenerate forms often teaches us more of the causes of change in organic nature than can be learned by the study of the progressive ones. G. B. H.

THE COMMERCIAL USES OF PEAT.

THE difficulty in obtaining coal for industrial purposes, and the high price that has had to be paid for it recently, especially where works are situated at long distances away from the mines, has led to more attention being paid to the use of peat for fuel. In the "Notes" of May 31, 1900 (vol. lxii. p. 108), a short description was given of the uses to which peat was being applied in Austria in the manufacture of textile fabrics. In a recent number of the *Engineer* (February 8, 1901) an account was also given of the peat fuel industry in Sweden. It is said that there is hardly any question of the day so prominent in that country as the use of peat fuel as a substitute for coal. The Government, recognising the importance of this matter, has appointed a Crown Peat Engineer, at a salary of 500*l.* a year, to survey the principal Crown peat bogs and to report upon the quality and suitability of the peat for use as fuel in locomotive engines. At several of the large works in Sweden peat is now used for generating steam. At the great Yungtell Metal Works and the Motala Shipbuilding Works, it is also used in generating furnace gases, the fuel being prepared by specially constructed works. At the former establishment, engines of 230 horse-power are supplied with steam generated by this fuel. In the province of Smaland a syndicate has recently purchased the peat bogs, from which it is estimated that a million tons of fuel will be produced in a year. At the Karpalund sugar refinery peat is now solely used for the nine boilers in use there of 100 horse-power each; the fuel being first converted into gas in generators in front of the boilers. This establishment has purchased an adjacent bog containing sufficient peat to supply the works for twenty years. The bog is connected with the factory by a Decauville railway. The furnaces were formerly fed by coal obtained from England, and a very great saving has been effected, the peat fuel costing less than half that of coal. On several of the railways peat is being tried as fuel for the locomotives with every promise of permanent success. There are several different kinds of machines for making this fuel. The process something resembles brick-making. The turf is cut from the bog either by manual labour or machinery, and stacked in summer to be air-dried, any remaining moisture being removed in heated drums or by centrifugals, and the peat is then compressed into briquettes. It is claimed that one ton of dried peat from the best class of bogs is equal to half a ton of English coal.

The largest area of peat in England is to be found in the Fen district, where it covers 600 square miles and the depth varies from 2 to 10 feet in thickness, and at Whittlesea Mere as much as 18 feet. Nearly the whole of the peat in the Fenland has been drained and is now cultivated.[1] In a few places in the Fens it is sun-dried and used for fuel. In the form of powder and mixed with carbolic acid it is also extensively used as a deodorant for earth closets and similar purposes, works for this purpose being established in Cambridgeshire.

There are also large deposits in the East Riding of Yorkshire along the valleys of the Trent and Ouse, Hatfield Chase covering 12,000 acres, where a manufactory has been for some years in existence for drying and preparing the peat for litter for stables and cow-houses. Its antiseptic properties make this litter very valuable, especially in large towns where straw is difficult to obtain. There are also large areas of peat in other parts of the country, as at Chatmoss in Lancashire and on Dartmoor.

In Ireland, the peat bogs cover about 5000 square miles, or about one-seventh of the whole country; some of the bogs are 43 feet deep, the average thickness being 26 feet. Occasionally, owing to an excess of water, the peat overflows the basin in which it is contained and flows over the cultivated land. Thus a few years ago the bog near Tullamore overflowed and covered nearly three square miles of land. Sun-dried peat is used in Ireland to a considerable extent for fuel. Some attempt has been made to work it for commercial purposes. The Irish Amelioration Society some years ago encouraged the conversion of it into charcoal, but the process was

[1] "The History of the Fens of South Lincolnshire." (London: Chapman and Hall.)

not found to pay commercially, although peat charcoal is well adapted for working and tempering iron for the finer kinds of cutlery. The Irish Peat Company erected extensive plant for drying and distilling the peat and producing tar, illuminating oil and paraffin. At these works, one ton of peat yielded 10 gallons of tar, or 28 lbs. of illuminating oil and 1 lb. of paraffin.

One of the last volumes of the Encyclopédie Scientifique, published in Paris,[1] is devoted to a treatise on peat and peat bogs. It describes the conditions under which peat was originally formed, the plants of which it is composed, the chemical analysis of its constituents, the principal bogs in Europe, the age of peat as deduced from the remains of animals, flint implements and tools found buried in it, the methods of obtaining and preparing peat for commercial purposes, the uses to which it is applied and its calorific value and antiseptic qualities.

W. H. WHEELER.

THE BRITISH AND GERMAN ANTARCTIC SHIPS.

THE two great Antarctic expeditions have made a stride towards completeness by the launch at Dundee and Kiel of the exploring ships *Discovery* and *Gauss*, both vessels built, at great expense, specially for service in the Antarctic ice. No complete official announcement of the organisation and programme of either expedition has yet been made. However, the two ships are afloat, and appear to be the finest vessels for ice-navigation ever constructed, not even excepting the *Fram*, which of course was planned for drifting with the ice-floes, not for sailing through them.

The following table compares the chief dimensions of the two vessels, so far as we have been able to ascertain them :—

	Discovery.	*Gauss.*
Length over all ... ... (feet) ...	—	168
,, at water line ... ,, .	172	—
,, between perpendiculars ,, ...	–	151
Extreme Breadth ... ... ,, ...	34	35
Probable displacement fully loaded (tons)	1750	1450
Horse-power	450	300-500
Rig	Barque	Barquentine
Complement all told (souls)	46	28

It is stated the name of *Gauss* was given to the German vessel by the Emperor to emphasise the scientific character of her mission by associating it with the memory of the great authority on terrestrial magnetism.

The German vessel, although a little smaller than the *Discovery*, is intended to carry so much smaller a crew that she will probably prove to be no more crowded with her stores and equipment. Both vessels are strongly built of oak and sheathed in greenheart. The *Discovery*, like the *Fram*, has her frames in contact throughout her whole length, and the joints caulked so that even if all her triple skin of planking were stripped from her the vessel would still be watertight and seaworthy. She is of whaler pattern to the extent that her sides are not pierced by any openings, the only daylight for the cabins coming from deck-lights ; but the cabins, though dark and uninviting at the launch, are exceptionally roomy and well-planned, and when lighted by the electric light will be extremely comfortable. The *Gauss* is also to be furnished with the vital necessity of electric light, a boon that none but polar voyagers can fully appreciate, and she is, in addition, to have the luxury of steam-pipes for heating purposes throughout the whole inhabited part of the ship ; the *Discovery* will probably be heated by stoves.

Both vessels are provided with wells and gear for hoisting out both rudder and propeller, and a spare rudder will be carried which can be shipped securely and speedily if the original steering gear should be seriously damaged. The bows of both ships are heavily plated with steel to enable them to cut through or break comparatively thin ice ; but the form of the stem is different. Both have a great sheer, so that the vessel would tend to ride up on any floating ice she encountered and break it with her weight, but the stem of the British ship is a straight line forming an obtuse angle with the keel, while that of the German vessel is a convex curve. The sterns also differ, that of the British vessel having a much longer overhanging counter than the *Gauss*, so that her length over all is probably from 15 to 20 feet greater.

The details of laboratory accommodation can be more profitably described when the space is finally apportioned and the equipment in place ; but the magnetic observatory on the *Discovery* has been very carefully planned so that it shall be more than 30 feet from any iron or steel —even the bolts and nails in its vicinity are all of brass.

The living rooms in both vessels are amidships, the stokehold and engine-room being placed right aft, while the whole lower hold is utilised as a great coal-bunker along the length of the ship. The *Discovery* is rigged as a barque ; the rig of the *Gauss* is officially described as that of a "three masted schooner," but her published sail-plan shows the foremast completely square-rigged, the main and mizzen having only fore-and-aft sails, so that she is better called a barquentine. We believe that this rig, rendered necessary probably on account of the small crew carried, is not a usual one for polar ships. Machinery and masts are now being rapidly put in place, and the *Discovery* may be expected in the Thames to take her stores on board about the end of May or early in June.

MEETING OF THE INTERNATIONAL ASSOCIATION OF ACADEMIES.

THE business of the Paris meeting of the International Association of Academies was commenced on Tuesday morning, when the delegates assembled at the Institute. The delegates were received, on Saturday, by the president ; and the French Government, as well as the Municipal Authorities, have combined with the Institute to make the meeting a success by facilitating all the arrangements and providing lavish entertainment. By this official action, the dignity and importance of the meeting are declared, and the delegates are made to feel that they are welcome visitors.

Tuesday's meeting was devoted to preparatory business, and M. Darboux gave an address on the objects and work of the Association. The financial position was considered, and suggested additions and alterations of the rules were discussed. A committee was appointed to consider a scheme for the mutual loan of manuscripts. In the evening, the president of the Institute, Count de Franqueville, gave a reception to the delegates and their families at his residence, the Château de la Muette. Yesterday the arrangements included a visit to the Château of Chantilly, bequeathed to the Institute by the Duc d'Aumale. This afternoon there will be a reception by M. Émile Faguet at the French Academy, and in the evening a dinner will be given by the Institute. On Saturday afternoon a visit will be made to the National Library, under the direction of M. Léopold Delisle, and on Saturday evening the Municipal Council will give a dinner to the delegates and members of the Institute. The dinner will be followed by a reception and concert, to which the families of the guests are invited. On Sunday a special piece will be represented at the Comédie-Française in honour of the delegates.

From this programme it will be seen that the serious

[1] "La Tourbe et Les Tourbières, par Alb Larbalétrier. Encyclopédie cientifique des Aide Memoire." (Paris : Masson et Cie.)